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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,270	08/27/2003	Yifan Gong	TI-35988	6432

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TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER	
LENNOX, NATALIE	

ART UNIT	PAPER NUMBER
2626	

NOTIFICATION DATE	DELIVERY MODE
05/29/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com
uspto@dlemail.itg.ti.com

Office Action Summary	Application No.	Applicant(s)	
	10/649,270	GONG ET AL.	
	Examiner	Art Unit	
	NATALIE LENNOX	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) *6,7 and 9* is/are withdrawn from consideration.

5)☒ Claim(s) *1-5 and 11-14* is/are allowed.

6)☒ Claim(s) *8, 10, and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action has been issued as a response to the amendments filed on January 23, 2008. Claims 6-7 and 9 are cancelled, claims 1, 8, and 10-11 are amended, and claims 12-15 are new. Upon further examination, dependency issues were further taken into consideration.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 19, 2008 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 8, 10, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mauro et al. (US 2001/0001853), hereinafter Mauro, in view of Tasaki (US Patent

5,822,732), and further in view of Markel (Digital Inverse Filtering – A New Tool for Formant Trajectory Estimation, June 1972).

As per claim 10, Mauro teaches a noise-resistant utterance detector comprising the steps of:

accepting a speech utterance input signal (Mauro's paragraph [0010], "frequency domain transformed speech signal"),

removing background noise from the utterance signal according to a spectral subtraction method to get a noise subtracted signal (Mauro's noise suppressor 108 from Figs. 1A and 1B),

calculating the autocorrelation from the inverse filtered signal to get an autocorrelation result (Mauro's paragraph [0039], wherein the rate decision element 212 of Fig. 2 for determining the presence of speech, may be substituted by a normalized autocorrelation function (NACF) which measures periodicity in the speech frame), and

detecting that a frame of the signal being processed is or is not speech based on a threshold applied to the autocorrelation result (Mauro's speech decision element 216 in Fig. 2, also paragraph [0059]).

However, Mauro does not specifically mention

inverse filtering the noise subtracted signal with a spectral inverse filter to get an inverse filtered signal, and

locating close low-frequency formants in the noise subtracted signal if they exist and inserting spectral valleys between said formants before said inverse filtering.

Conversely, Tasaki teaches

inverse filtering the noise subtracted signal with a spectral inverse filter to get an inverse filtered signal (Tasaki's inverse filter LPC filter 205 from Fig. 1, also Col. 4, lines 15-20), and

locating close low-frequency formants in the noise subtracted signal if they exist and inserting spectral valleys between said formants before said inverse filtering (Tasaki's LSP modification 217 from Fig. 1, PARCOR modification 236 from Fig. 19, LAR modification 242 from Fig. 23, also Col. 19, lines 12-18 and Col. 15, lines 60-67).

It would have been obvious to one having ordinary skill in the art to use the features of an inverse filter, and locating close low-frequency formants and inserting spectral valleys between said formants as taught by Tasaki for Mauro's method for detecting speech because Tasaki provides a system and a method for extracting from the input speech signals parameters indicative of their characteristics, transmitting or storing the extracted parameters, and synthesizing the original speech signals on the basis of the transmitted or stored parameters. More specifically, Tasaki provides a system, a method and a filter for enhancing the quality of the signal such as speech intelligibility. More specifically, he provides speech enhancement which is suitable for improving the speech intelligibility of the signal having distortions caused by analog transmission or the signal received by the hard-of- hearing aid apparatus and which is suitable for improving the brightness of the speech to be broadcasted or to be output by a loud-speaker (Col. 1, lines 13-30).

However, neither Mauro nor Tasaki specifically mention

wherein said spectral inverse filter is based on a normalized approximation of an envelope of a short term speech spectrum derived from a local maxima of said short term speech spectrum.

Conversely, Markel teaches

wherein said spectral inverse filter is based on a normalized approximation of an envelope of a short term speech spectrum derived from a local maxima of said short term speech spectrum (In Markel's part IV (The Inverse Filter Algorithm) on page 133, 3rd paragraph on the right, "the magnitude spectrum corresponding to the estimate of the input spectrum is computed. The magnitude spectrum is scanned and the L_k local maxima $p_k(I)$, I= 1, 2, ..., L_k in frame k are recorded. The set of all local maxima defines the raw data from which the formant trajectories are to be estimated." Also on part IV, page 131, 3rd paragraph on the right, "since speech is a continually time-varying process, short-term analysis of sets of contiguous data samples at some specified frame rate is needed.").

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use the feature of a spectral inverse filter as taught by Markel for Mauro's method, as modified by Tasaki, because Markel provides an inverse filter useful for estimating resonance or formant structure of voiced speech.

As per claim 8, Mauro, as modified above, teaches the method of claim 10. Mauro does not, but Markel does teach wherein said inverse filtering is performed in a log frequency domain and is implemented by subtracting from the original spectrum the

estimated inverse filtering spectrum (In Markel's part III (Formant Extraction and the Inverse Filter) on page 130, where Fig. 1 (A) shows the representative spectrum, Fig. 1 (C) shows the estimated inverse filtering spectrum and Fig. 1 (D) shows the spectrum of the inverse filter output. From the figures it can be appreciated that the filtering is performed in a log frequency domain and that the inverse filter output of Fig. 1 (D) is obtained from subtracting the spectrum of Fig. 1 (C) from the original spectrum of Fig. 1 (A).).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use the feature of inverse filtering in a log frequency domain and subtracting the estimated inverse filtering spectrum from an original spectrum as taught by Markel for Mauro's method, as modified by Tasaki, because Markel provides an inverse filter useful for estimating resonance or formant structure of voiced speech.

As per claim 15, Mauro teaches a method of determining if a signal includes speech, comprising:

accepting an input signal (Mauro's paragraph [0010], "frequency domain transformed speech signal");

removing background noise from said input signal according to a spectral subtraction method to obtain a noise subtracted signal (Mauro's noise suppressor 108 from Figs. 1A and 1B);

calculating the autocorrelation from said inverse filtered signal to get an autocorrelation result (Mauro's paragraph [0039], wherein the rate decision element 212

of Fig. 2 for determining the presence of speech, may be substituted by a normalized autocorrelation function (NACF) which measures periodicity in the speech frame); and

detecting that a frame of said input signal is or is not speech based on a threshold applied to said autocorrelation result (Mauro's speech decision element 216 in Fig. 2, also paragraph [0059]).

However, Mauro does not specifically mention

inverse filtering said noise subtracted signal with a spectral inverse filter to obtain an inverse filtered signal.

Conversely, Tasaki teaches

inverse filtering said noise subtracted signal with a spectral inverse filter to obtain an inverse filtered signal (Tasaki's inverse filter LPC filter 205 from Fig. 1, also Col. 4, lines 15-20).

It would have been obvious to one having ordinary skill in the art to use the features of an inverse filter as taught by Tasaki for Mauro's method for detecting speech because Tasaki provides a system and a method for extracting from the input speech signals parameters indicative of their characteristics, transmitting or storing the extracted parameters, and synthesizing the original speech signals on the basis of the transmitted or stored parameters. More specifically, Tasaki provides a system, a method and a filter for enhancing the quality of the signal such as speech intelligibility. More specifically, he provides speech enhancement which is suitable for improving the speech intelligibility of the signal having distortions caused by analog transmission or the signal received by the hard-of- hearing aid apparatus and which is suitable for

improving the brightness of the speech to be broadcasted or to be output by a loud-speaker (Col. 1, lines 13-30).

However, neither Mauro nor Tasaki specifically mention

wherein said inverse filtering is performed in a log frequency domain and is implemented by subtracting an estimated inverse filtering spectrum from an original spectrum of said input signal.

Conversely, Markel teaches

wherein said inverse filtering is performed in a log frequency domain and is implemented by subtracting an estimated inverse filtering spectrum from an original spectrum of said input signal (In Markel's part III (Formant Extraction and the Inverse Filter) on page 130, where Fig. 1 (A) shows the representative spectrum, Fig. 1 (C) shows the estimated inverse filtering spectrum and Fig. 1 (D) shows the spectrum of the inverse filter output. From the figures it can be appreciated that the filtering is performed in a log frequency domain and that the inverse filter output of Fig. 1 (D) is obtained from subtracting the spectrum of Fig. 1 (C) from the original spectrum of Fig. 1 (A).).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use the feature of inverse filtering in a log frequency domain and subtracting the estimated inverse filtering spectrum from an original spectrum as taught by Markel for Mauro's method, as modified by Tasaki, because Markel provides an inverse filter useful for estimating resonance or formant structure of voiced speech.

Allowable Subject Matter

4. Claims 1 and 11 are allowed. Claims 2-5 and 12-14 are allowed for being dependent on their allowed parent claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATALIE LENNOX whose telephone number is (571)270-1649. The examiner can normally be reached on Monday to Friday 9:30 am - 7 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571)272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NL 05/20/2008

/Richemond Dorvil/
Supervisory Patent Examiner, Art Unit 2626